

**Determinants of High School Optional Course Participation and Performance:
A Four-Year Longitudinal Study**

Final Report to the Spencer Foundation

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Running Head: High School Optional Course Enrollment and Performance

Abstract

This project was a four-year longitudinal study that followed a group of high school students from 9th to 12th grade, with initial student assessments of abilities, annual student assessments of academic self-concept, personality, motivation, goals, and other characteristics, annual parent assessments of student effort, achievement and goals, and annual English, math, and science teacher assessments of student effort and achievement. Student transcripts, 12th grade assessments of student abilities, and an assessment of student domain knowledge provided the key criterion variables for the evaluation of elective course enrollment patterns and measures of student achievement. Good stability for individual differences measures of self-concept, personality, and motivational traits was indicated across the high school years, though mean gender differences and year-to-year changes in several key variables were found. Measures of ability, personality, and self-concept administered in 9th grade, accounted for substantial variance in both final high-school GPA and the number of Advanced Placement/College-credit courses that students enrolled in across the high school years. Student goals and parent assessments of student skills, effort, and degree of parent supervision of student homework/studying activities also significantly predicted student participation in advanced optional courses in high school. Together these measures accounted for 54% of the variance in the number of AP/college-credit courses enrolled in during high school. Finally, the number of AP/college-credit courses students enrolled in, provided significant incremental validity in the prediction of an overall composite of domain knowledge assessed in 12th grade.

*What do we know now that we did not know before?**Predictors of Academic Achievement*

- Ninth-grade assessments of student abilities, personality, and self-concept together accounted for 35% of the variance in 9th grade GPA, and 18% of the variance in 12th grade GPA.
- Inclusion of 9th grade parent assessments of student effort and goals and student self-reported goals increased the variance accounted for in 9th grade GPA to 50% and 12th grade variance accounted for to 29%.

Predictors of Advanced Placement/College Course Enrollment

- Ninth-grade assessments of student abilities, personality, and self-concept together accounted for 24% of the variance in an indicator of whether or not the student completed one or more Advanced Placement (AP)/College-credit courses in high school, and 43% of the variance in an indicator of the *number* of AP/College-credit courses that students enrolled in during high school.
- Inclusion of 9th grade parent assessments of student effort and goals, student self-reported goals, and 9th grade GPA, increased the variance accounted for in AP/College-credit enrollment to 34% of the variance, and increased the variance accounted for in *number* of AP/College-credit courses to 54%.

Predictors of 12th Grade Ability and Domain Knowledge Criteria

- Ninth-grade assessments of student abilities, personality, and self-concept together accounted for 43% of the variance in 12th grade Vocabulary scores, 20% of the variance in 12th grade Math ability scores, and 52% of the variance in a composite measure of domain knowledge (across U.S. History, Biology, Western Civilization, U.S. Literature, Chemistry, and U. S. Government domains). Inclusion of parent assessments, student goals, and cumulative GPA increased the amount of variance accounted for in Vocabulary scores to 48%, in Math ability scores to 27% and domain knowledge scores to 60%.
- Inclusion of the number of AP/College credit courses completed had no effect on the prediction of either Vocabulary or Math ability scores, but accounted for a significant 6% of the variance in domain knowledge scores, beyond student ability, personality, self-concept, parent ratings, student goals, and GPA predictors.

Alterations to the original research plan?

There were no major alterations to the research plan. The only substantive change was that the original proposal called for 1,000 student participants, and 914 students enrolled in the study. We sent out roughly 7,000 recruitment letters and received 1,148 parent consent/student assent forms. However, only 914 students completed the initial assessment by the end of the fall term of the 9th grade, even with multiple reminders. Because of the time-critical nature of the start of the study (the fall term of the 9th grade), it was not possible to recruit additional participants, once we had reached the end of the fall term. The alteration of the proposed time-line from starting in Fall, 2006 was brought about because funding only came available from the Spencer Foundation in November of 2006. Thus, we followed the Fall, 2007 cohort of 9th grade students, putting the time-line out one year from the original proposal. Minor additional delays took place when some schools had difficulty in providing us with the final student transcripts until this fall.

How might findings contribute to educational improvement? ...in the short term? in the long term?

Short Term. AP and college-course dual-enrollments have historically been accessible mainly to a very small talented portion of the high-school population. However, in the last decade or so, enrollment in these types of courses has exploded, such that in 2010, 3.2 million AP exams were completed by 1.8 million students. The expansion of AP course offerings has made AP-type courses available to a much larger portion of the high-school population. Historically, GPA has been the major determining factor for students to gain entry to AP-type courses in high school. The current results support the proposition that grades are indeed important indicators of AP-type course achievement. However, our study results indicate that other factors are key indicators of AP success, and should be taken into account to aid students in selecting the number and topic domains of available AP courses. In the short term, with some additional developmental research, it could be possible to provide self-assessment instruments that provide students with assessments of their strengths and weaknesses, and a tailored list of AP-type courses that students should consider for enrollment during high school. These instruments could also take account of other research we and others have conducted that maps the types of AP-type credits obtained with majors and time-to-degree information from college-

level data. For example, by linking student ability, personality, motivational trait, and self-concept data obtained in the current study, with other data on college majors (contrasting Science, Technology, Engineering and Math [STEM] with non-STEM areas), we could provide individualized recommendations for student high-school portfolios in preparation for college/university study.

Long Term. In the long term, data from the current study and others could be used to optimize students' development and achievement in high school, with special attention to preparation for particular majors in college/university study. Because there are particular AP-type courses that are optimal for the success of students in STEM areas especially, early identification of students who have the cognitive, affective, and conative traits that are best suited to these college/university majors is essential for increasing the number of talented students who persist in STEM areas while in college/university study. Some 'pipeline' issues have been identified by others (e.g., algebra course completion in 8th grade leading to AP Calculus course completion in 12th grade). However, the notion of a student having a particular "portfolio" of AP-type courses in preparation for specific domains of college/university study is novel. In the long term, we hope to be able to provide the necessary information to various stakeholders (students, teachers, school administrators) that would allow for a more efficient and effective means for identifying talent for AP-type courses early in high school, and for preparing individually-optimized elective course plans for talented students that will optimize their achievement and preparation for college/university study.

Development of researchers and early-career scholars

This project has involved several graduate students and undergraduate students at various stages of their development. Their key contributions to the mentoring of these students has been by actively involving them in all phases of the process in interacting with school personnel including teachers and principals/administrative staff, students and parents, and in assisting with the development, administration, and coding of the various ability, personality, self-concept, motivational and assessment instruments. The undergraduate students in particular were introduced to the policies and procedures of conducting educational research, and were actively involved in generating protocols for transcript coding and interpretation.

Data/Measures

Once we have completed the substantive analyses of the study data, we expect to make the data available to other qualified researchers, subject to our Institutional Review Board requirements to remove any identifying information, and further subject to the individual school and county data sharing requirements.

Papers and Conference Presentations

Because we have only recently completed data coding of the final high school transcripts, only interim presentations of the results have been completed. We expect to now be able to prepare several additional papers and conference presentations, based on the complete data we have received and processed. Presentations to date based in whole or in part on the study data are listed below:

Ackerman, P. L., & Kanfer, R. (May, 2010). *Determinants of high school optional course participation and performance: A longitudinal study of individual and gender differences*. Paper presented at the annual meeting of the American Educational Research Association. Denver, CO.

Ackerman, P. L. (May, 2011). *Parsing individual differences variance in predicting academic achievement*. Symposium paper presented at the annual meeting of the Association for Psychological Science, Washington, DC.

Ackerman, P. L. (2011, July). *Cognitive, affective, and conative individual differences: Communalities, uniquenesses, and prospects for integration*. Invited keynote address presented at the biennial meeting of the International Society for the Study of Individual Differences, London, UK.

Personnel

<i>Name</i>	<i>Funded?</i>	<i>Role</i>
Phillip Ackerman	Yes	Faculty Member
Ruth Kanfer	Yes	Faculty Member
Matthew Betts	Yes	Graduate Student
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Erin Marie Conklin	Yes	Graduate Student
Katie [McNulty] Fowler	No	Undergraduate and Graduate Student
Matthew Kerry	Yes	Graduate Student
Sunni [Haag] Newton	Yes	Graduate Student
Stacey [Wolman] Shapiro	Yes	Graduate Student
Ethan Craig	Yes	Undergraduate Student
Aurora Dixon	Yes	Undergraduate Student
Yarden Moskovitch	Yes	Undergraduate Student
Trishna Patel	Yes	Undergraduate Student
Richelle Reinhart	Yes	Undergraduate Student
Piper Vornholdt	Yes	Undergraduate Student
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